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Recreational Game Hunting: Motivations, Satisfactions and Participation

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Chapter 1
Introduction

New Zealand recreational hunting management is on the cusp of major change with the possibility of the New Zealand Game Animal Council (NZGAC) gaining responsibility for managing hunting on much of the public estate. In order to manage hunting effectively the NZGAC will need to, amongst other things, understand the aspirations of recreational hunters, which raises the question of why people hunt and what makes a successful hunting trip. Other questions are important too: How many people hunt? What species do they hunt? Are they hunting for meat or trophies? What constitutes a trophy? These might seem like simple questions, but New Zealand data are extremely sparse, probably because of the "pest management" philosophy of hunting administration in recent times. Several of these matters are left for later study. This report reviews the international and New Zealand literature on hunter motivations, factors influencing hunter satisfaction, and participation.

The objectives of this report are to review New Zealand and international literature to identify the main motivations for participating in hunting, to identify the factors that influence hunter satisfaction, and to make an initial assessment of New Zealand participation levels. Section 2 briefly reports the methods employed to analyse the literature. Results are reported in Sections 3-5 and conclusions are drawn in Section 6.

Chapter 2
Methodology

This report is based on qualitative and quantitative studies into hunter participation and motivations. Participation data for North America have been obtained from the ongoing recreational hunter surveys undertaken by the United States Fish and Wildlife service (USFWS) and the Canadian Wildlife Service. Participation data for New Zealand have been obtained from nation-wide surveys (only one specific to hunting), city-specific recreation surveys, and site-specific user surveys. Only one study was located that provided an estimate of national hunting participation for Australia, although data were also obtained from a state government administered survey of hunters in the state of Victoria, and a survey of hunters in New South Wales. Limited European information has been identified, mostly from the Federation of Associations for Hunting and Conservation of the EU (FACE)[1]. Factors affecting participation are identified by scrutiny of studies of particular hunting sites to identify how characteristics of the individual affect hunting avidity and how the characteristics of the hunting experience, such as site accessibility and game abundance, affect hunting frequency. Studies of hunter motivations have evolved from a traditional view to the currently accepted "multiple satisfactions" perspective which is analysed here. However, motivations and satisfactions studies often have specific foci that limit the range of explanatory factors analysed, as summarised in Table 1.

Notably, all six New Zealand studies in Table 1 address motivations, but only three address satisfaction, and none addresses contributory factors. The last New Zealand satisfaction study was published by Cessford in 1987.

1 http://www.face.eu/

Table 1
Table Examples of literature reporting hunter motivations, satisfaction and quality

Study	Primary study focus			Contributory factors			
	Motivations	Satisfaction	Quality	Harvest success	Regulation	Hunter numbers	Multiple factors
McCullough & Carmen (1982)		•	•				•
Rollins & Romano (1989)		•			•		
Decker & Connelly (1989)	•				•		
Hammitt *et al*. (1990)		•					•
Duda *et al*. (1995)		•					
Tynon (1997)			•				
Adams & Steen (1997)	•						
Wentz & Seng (2000)	•						
Gigliotti (2000)		•		•			
Botton et al. (2001)	•						
Backman *et al*. (2001)	•						
Collier & Krementz (2002)			•				
Heberlein & Kuentzel (2002)	•	•				•	
Fulton & Hundertmark (2004)		•			•		
Fulton & Manfredo (2004)		•			•		
Grilliot & Armstrong (2005)	•	•					
Bhandari *et al*. (2006)	•			•			
Mangun (2007)			•				
Frawley & Rudolph (2008)	•						
New Zealand studies							
Simmons & Devlin (1981)	•	•					
Groome *et al*. (1983b)	•	•					
Cessford (1987)	•	•					
Fraser & Sweetapple (1992)	•						
Davys *et al*. (1999)	•						
Gidlow *et a*l. (2009)	•						

2.1 Theoretical Background

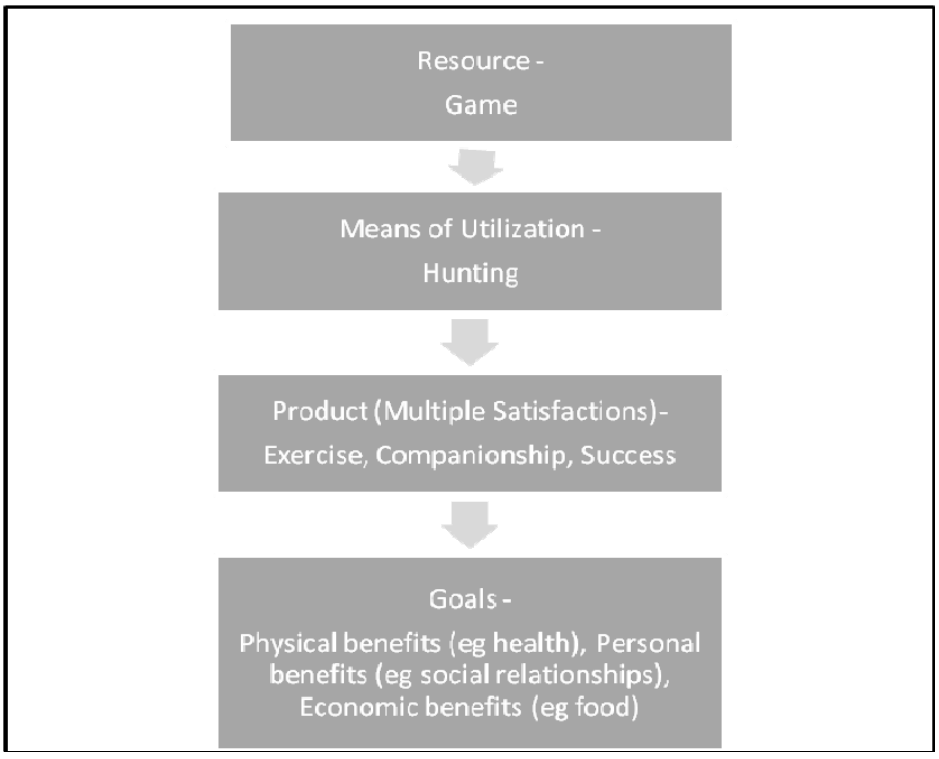
Wildlife management in North America has undergone a number of paradigm shifts since its inception in the late 1800s and early 1900s. These changes have been described by Gigliotti (2009), whose work provides the basis for the following interpretation. Prior to the introduction of formal wildlife management, people hunted without restriction, which led to the near extinction of some wildlife populations. Wildlife agencies were formed, with the aim of maintaining populations so that hunting could continue, leading to the introduction of regulations and their enforcement. With the publication of Aldo Leopold's 'Game Management' (Leopold, 1933), the idea of using science to improve game animal populations led to a new way of managing wildlife. While regulations and their enforcement were still important parts of wildlife management, techniques such as predator control, reservation of game land and population management were introduced. During the 1960s and 1970s, wildlife management underwent another paradigm shift, with recognition of the human dimensions of wildlife management. As the

way in which wildlife managers viewed their role changed, so did the way in which they measured success (Hendee, 1974; Gigliotti, 2009).

The aim of wildlife agencies has traditionally been to provide hunters with satisfying hunting experiences, and satisfaction was thought to be based solely upon harvest success, in the belief that people participated in hunting in order to harvest animals, usually for food (Hendee, 1974). Therefore, wildlife agencies viewed the success of hunters, and therefore their own management efforts, in terms of numbers of animals harvested (Gigliotti, 2009). Hunter numbers in North America continued to increase, despite decreasing chances of harvesting an animal, a result that contradicted the theory of the time and led to recognition that harvest success was not the only benefit for hunters (Hendee, 1974; Gigliotti, 2009). Wildlife agencies began to measure success in terms of the 'recreation' provided by hunting, rather than the number of animals harvested, and the concept of 'days-a-field' was introduced (Hendee, 1974; Gigliotti, 2009). There were a number of problems with this approach because hunting areas were managed in order to maximise hunter numbers, which led to hunter dissatisfaction due to crowding and safety concerns (Gigliotti, 2009).

The 'multiple satisfactions' approach began to emerge in the late 1960s and early 1970s, and reflects the change in paradigm that the wildlife management agencies were undergoing at the time (Gigliotti, 2009). Hendee (1974) explains the rationale behind the approach, which recognises that people seek to meet a number of benefits and satisfactions through participation in hunting, and that these benefits and satisfactions may differ between people, locations and methods of hunting (Figure 1).

Figure 1
The Multiple Satisfactions Approach related to Hunting (Hendee, 1974)



The term 'motivation' is defined by Manfredo *et al*. (2004) as a specific force directing an individual's behaviour in order to satisfy a goal. For hunters, these motivational goals may be to harvest an animal for meat, to spend time outdoors, or to spend time with friends and family. The term 'satisfaction', as used in the multiple satisfactions approach, refers to these motivational goals that the individual is aiming to meet. In this context, hunter motivations are the satisfactions sought by the individual hunter. Hendee (1974) argues that the basic principle of the multiple satisfactions approach to game management is that the most important products of game management programmes are hunting experiences that allow hunters to meet these satisfactions, which vary between individuals due to different motivations.

The term 'satisfaction' has been used in two main ways throughout the literature (Manfredo *et al*., 2004). The first definition of 'satisfaction', as discussed above, uses the term to describe the motivational goals which hunters seek to achieve (Hendee, 1974). The second way in which the term has been used is as an overall evaluation of either the hunting experience, or the hunt (Rollins & Romano, 1989; Hammitt, *et al*., 1990). Most authors note that satisfaction as an overall evaluation depends on a number of satisfaction variables, and that these and their relative importance vary between hunters (Gigliotti, 2000; Grilliot & Armstrong, 2005; Fulton & Hundertmark, 2004; McCullough & Carmen, 1982; Fulton & Manfredo, 2004; Tynon, 1997).

Wildlife managers aim to provide satisfying hunting experiences, and in order to do so it could be helpful to define satisfaction variables that are, to some extent, within the control of management. Rollins and Romano (1989) describe two categories that have appeared within the literature, 'situational' variables (deer density, hunter density and the probability of taking shots and seeing deer) and 'subjective' variables (enjoying nature, and time with friends and family). Management can influence some components of each category. For example, deer and hunter density are both controllable situational variables. The abilities of hunters to enjoy nature can be influenced by environmental conditions in the hunting area, and the social aspects of the hunting experience may be influenced by the way in which hunting permits are allocated.

Because hunters may be seeking a number of satisfactions from their hunting experience, and these vary between hunters, the 'quality' of the experience for each individual can be evaluated by the extent to which these different satisfactions are met (Hendee, 1974). This may mean that a hunter who was unsuccessful in harvesting an animal could still determine that the hunt was of reasonable quality due to a number of other satisfactions being met, for example the enjoyment of being outdoors and solitude, while another hunter may find this a poor quality hunt. Manfredo *et al*. (2004) define quality as the extent to which the hunting trip met the desired satisfactions, and provide examples of a high quality trophy hunt and a high quality meat hunt as quality experiences with different outcomes.

Many wildlife management agencies gain funding for wildlife conservation programs primarily through revenue from hunter licence fees. Growing concern over declining hunter numbers has led to a number of studies into hunter recruitment, retention,

motivations and satisfaction (Brown & Messmer, 2009). Results from a review of the literature in this area are presented in the following sections.

Chapter 3
Hunter Motivations

Motivations can be considered a specific force directing an individual's behaviour in order to satisfy a goal such as obtaining meat, excitement or time outdoors (Manfredo *et al*., 2004). This section first provides an overview of the literature which ranks or discusses the importance of motivational goals. The way in which a number of factors affect hunters' overall evaluations of satisfaction is then discussed.

3.1 Types of Motivations

A number of studies have examined the relative importance of hunter motivations and the satisfactions sought (Decker & Connelly, 1989; Gigliotti, 2000; Bhandari *et al*., 2006; Frawley & Rudolph, 2008; Grilliot & Armstrong, 2005; Backman *et al*., 2001; Gidlow *et al*., 2009; Simmons & Devlin, 1991; Groome *et al*., 1983b; Cessford, 1987; Fraser & Sweetapple, 1992; Davys *et al.*, 1999; Adams & Steen, 1997).

Decker and Connelly (1989) proposed three categories of motivations; achievement oriented, affiliation oriented, and appreciation oriented.

- Achievement oriented hunters are motivated by the attainment of a particular goal, which may be harvesting an animal for meat, a trophy or a display of skill.
- Affiliation oriented hunters participate in hunting with the primary purpose of fostering personal relationships with friends, family or hunting companions.
- Appreciation oriented hunters are motivated by a desire to be outdoors, escape everyday stress or to relax.

An individual hunter's main motivation may change, and hunters are often achievement oriented when they begin hunting, and becoming more affiliation or appreciation oriented as they get older (Wentz & Seng, 2000).

Gigliotti (2000) defined seven categories of hunter motivations, which split achievement motivation into meat and trophy motivations, appreciative into nature and solitude motivations, retained affiliation as social motivation, and added exercise and the physiological effects of excitement (e.g. increased heart rate). These motivation categories were also used by Grilliot & Armstrong (2005), and slightly modified by Backman *et al*. (2001). Desire to manage the deer population is a further motivation introduced by Bhandari *et al*. (2006).

Table 2 summarises rankings of hunting motivations from the literature[2]. The motivations are divided into motivations purely intrinsic to the hunter, such as being in nature or socialising with friends or family (Table 3), and motivations that involve an interaction with

2 Studies use different methods of ranking the importance of motivations, including Likert scales and counting the frequencies that motivations are mentioned. Due to the difficulty in comparing results, Tables 2, 3 & 4 provide only a broad indication of the relative importance of motivations.

animals, such as getting a trophy, taking a shot at a deer, or the excitement of seeing a deer (Table 4). Stedman & Heberlein (1997) claim animal interaction motives are the most crucial in understanding hunter behaviour. They argue that the purely hunter based motivations can be achieved by taking part in many other activities, whereas motivations involving encounters with animals, such as taking shots at deer, are unique to hunting. Their study explains the importance of excitement as a physiological response in hunters, manifested as an elevated heart rate upon seeing a deer (often followed by taking a shot at a deer). This physiological response is suggestive of an emotional component to hunting (Stedman & Heberlein, 1997).

Table 2
Motivation Rankings

Study	Motivation Rankings (highest → lowest)							
Frawley & Rudolph (2008)	Nature	Social	Excitement	Solitude	Exercise	Meat	Demonstrating skill	Trophy
Giglotti (2000)	Nature	Social	Excitement	Meat	Trophy	Solitude	Exercise	
Grilliot & Armstrong (2005)	Nature	Excitement	Social	Meat/ Sport	Sport/ Meat	Solitude	Trophy	
Backman *et al*. (2001) residents	Social	Nature	Excitement	Meat	Challenge	Trophy	Solitude	
Backman *et al*. (2001) non residents	Social	Nature	Excitement	Challenge	Trophy	Meat	Solitude	
Decker & Connelly (1989)	Nature	Seeing a deer/ signs	Exit civilisation/ relaxing	Using skills	Shots at deer	Social		
Bhandari *et al*. (2006)	Get outdoors	Exit civilisation	Social	Managing population	Meat	Trophy		
Kroezen (2005)	Sport	Meat	Managing population	Trophy				
Adams & Steen (1997)	Meat	Nature	Social					
Decker & Connelly (1989)	Appreciative	Affiliative	Achievement					
New Zealand Studies								
Gidlow *et al*. (2009)	Nature	Meat	New places	Social				
Simmons & Devlin (1991)	Environmental	Activity	Physical	Social				
Groome *et al*. (1983b)	Environmental	Activity	Physical	Social				
Cessford (1987)	Nature	Exit civilisation	Excitement	Meat/Trophy				
Fraser & Sweetapple (1992)	Deer presence	Meat	Nature					
Davys *et al*. (1999)	Trophy	Nature	Challenge	Meat				

Table 3
Hunter-based motivation rankings

Study	Motivation Rankings (highest → lowest)			
Frawley & Rudolph (2008)	Nature	Social	Solitude	Exercise
Gigliotti (2000)	Nature	Social	Solitude	Exercise
Grilliot & Armstrong (2005)	Nature	Social	Sport	Solitude
Backman *et al*. (2001)	Social	Nature	Challenge	Solitude
Decker & Connelly (1989)	Nature	Exit civilisation	Social	
Bhandari *et al*. (2006)	Nature	Exit civilisation	Social	
Adams & Steen (1997)	Nature	Social		
Kroezen (2005)	Sport			
New Zealand Studies				
Gidlow *et al*. (2009)	Nature	New places	Social	
Simmons & Devlin (1991)	Environmental	Activity	Physical	Social
Groome *et al*. (1983b)	Environmental	Activity	Physical	Social
Cessford (1987)	Nature	Exit civilisation	Excitement	Meat/Trophy
Fraser & Sweetapple (1992)	Nature			
Davys *et al.* (1999)	Nature	Challenge		

Table 4
Animal interaction based motivation rankings

Study	Motivation Rankings (highest → lowest)			
Frawley & Rudolph (2008)	Excitement	Meat	Demonstrating skill	Trophy
Bhandari *et al*. (2006)	Manage population	Meat	Trophy	
Decker & Connelly (1989)	Seeing deer/signs	Using skills	Shots at deer	
Giglotti (2000)	Excitement	Meat	Trophy	
Grilliot & Armstrong (2005)	Excitement	Meat	Trophy	
Backman *et al*. (2001) residents	Excitement	Meat	Trophy	
Backman *et al*. (2001) non-residents	Excitement	Trophy	Meat	
Kroezen (2005)	Meat	Manage population	Trophy	
Adams & Steen (1997)	Meat			
New Zealand Studies				
Cessford (1987)	Excitement	Meat/Trophy		
Fraser & Sweetapple (1992)	Deer presence	Meat		
Davys *et al.* (1999)	Trophy	Meat		
Gidlow *et al*. (2009)	Meat	Skills	Trophy	

Although wildlife management agencies do not have control over hunter motivations, gaining an understanding of hunter motivations is important. With knowledge of what individuals' motivations are, managers may be able to provide more satisfying hunting experiences. Being in or experiencing nature has been consistently ranked the most important hunter based motivation, with the social aspect of time with family or hunting companions coming second. The third most important motivation is exiting civilisation, followed by solitude, challenge, sport and exercise.

Of the motivations that relate to interactions with animals, excitement was the highest ranked in most studies. The high rank of the motivation category 'seeing a deer or deer signs' may be due to the excitement response, or it may be because seeing deer and signs contribute to a perception of a large herd size, and expectations of a higher success rate, although that perception may be misplaced (van Deelen and Etter, 2003). Although

managing the animal population was not very frequently given as a motivation, when it was, it was ranked either as the most or second most important. Of the two harvest motivations, hunting for meat was generally ranked more important than hunting for a trophy.

3.2 New Zealand

The categories used to group motivations are similar for several New Zealand empirical hunting motivations studies, and include: environmental motivations, activity based motivations, physical motivations and social motivations. Environmental motivations include 'exit civilisation' and 'aesthetic/religious', while activity based motivations refer to motivations such as skill development and reward of the catch (Table 5).

Table 5
Primary motivations for New Zealand hunters (%)

	Lake Sumner[a]	Central North Island[b]	Kaimanawa /Kaweka[c]
Environmental	44.7	42.9	
Exit civilisation			5.2
Aesthetic-religious			5.4
Activity (thrill of hunt/challenge/skill/meat/money/trophy)	29.3	38.7	72.2
Physical exercise	9.7	5.7	1.4
Social	3.3	0.8	1.7
Other/new area	8.0	2.7	8.3
No response	5.0	9.2	6.1

[a] Simmons & Devlin (1981)
[b] Groome *et al*. (1983a)
[c] Groome *et al*. (1983b)

Cessford (1987) investigated motivations of hunters in the Greenstone and Caples values. The most important primary motivation was experiencing nature and scenery (Table 6), although catch/reward was the most mentioned motivation over all, appearing frequently as a second, third or fourth motivation.

Table 6
Greenstone/Caples hunter motivations for hunting in the area (Cessford, 1987)

		1st (%)	2nd (%)	3rd (%)	4th (%)	**Total (%)**
Activity-specific	Activity participation	11	6	12	12	**41**
	Personal experience	16	11	11	10	**48**
	Catch/reward	12	23	21	22	**78**
	Challenge	9	9	4	3	**25**
Environmental	Nature/scenery	20	15	14	10	**59**
	Exit civilisation	16	14	16	8	**54**
	Aesthetic appreciation	3	2	1	1	**7**
Physical	Exercise/fitness/health	4	6	2	18	**30**
	Relaxation/peacefulness	3	5	3	1	**12**
Convenience		2	4	6	4	**16**
Social		4	5	10	5	**24**
Other		2	0	1	3	**6**

A more recent study by Fraser & Sweetapple (1992) identified motivations for hunting in the Kaimanawa RHA. Again, the act of hunting and "going bush" are more important than the venison produced from the hunt (Table 7).

Table 7
Motivations (Fraser & Sweetapple, 1992)

	Order of preference (%)		
	First	Second	Third
Attraction of hunting Sika deer	42	17	15
Going bush	18	15	21
Hunting for a Sika trophy	16	12	11
Venison	13	32	18
Exploring a new area	4	13	19
Higher deer densities than other areas	1	6	8
Close to home	0	0	6
Other	6	5	2
Total	100	100	100

Gidlow *et al*. (2009) present an extensive list of motivations for hunting by North Canterbury New Zealand Deerstalkers' Association (NZDA) members (Table 8). As with other studies, enjoying nature was extremely prominent for this group of hunters, with "being in wild places" easily the most frequently cited motivation. Harvesting food was more important than trophy – although trophy is a motivation for over half the NZDA members who participated in the study, and social reasons are significant – particularly involving friends.

Table 8
Motivations of North Canterbury NZDA members (Gidlow *et al*., 2009)

Motivation	Motivated the hunter (%)
Being in wild places	92.3
Catch food	75.4
Experience new places	66.9
Quality time with mates	65.4
Observing nature	63.8
Demonstrate skill	59.2
Test self	59.2
Trophy	57.7
Leave work behind	54.6
Solitude and quiet	54.6
New appreciation of nature	40.8
Revisit familiar places	35.4
Quality time with family	34.6
Leave family obligations	11.5
Other motives	7.7

Two New Zealand studies asked hunters about the importance of harvesting an animal, both during day hunts and during multi-day hunting trips (Simmons & Devlin, 1981; Groome *et al*. 1983b). Both of these studies asked hunters to score the importance of harvesting an animal on a five point scale (1 being not important, 5 being essential). The largest group of hunters (approximately 30%) scored the importance of harvesting an animal as 'neutral' (a score of 3 on the 5 point scale), although there were also significant numbers of hunters who scored harvest as 'essential' (Table 9). A total of 9.5 percent of Canterbury hunters ranked harvest success as essential for a day hunt, and 18.4 percent ranked it as essential for overnight or longer trips (Simmons & Devlin, 1981). Larger groups of hunters from the Central North Island reported harvest success as essential, with 18.8 percent ranking it as essential for day trips, and 28 percent for overnight trips or longer (Groome *et al.*, 1983b). The importance of killing an animal has been evaluated in two New Zealand studies (Table 9). As with studies conducted abroad, it is apparent that it is not essential for most hunters to kill an animal to have a successful hunt, even for multi-day trips entailing greater investment of time and effort.

Table 9
The importance of killing an animal (%)

		Not important	Neutral	Essential
Day trips	Lake Sumner[a]	15.2	30.4	9.5
	Central North Island[b]	14.8	35.0	18.8
Multi-day trips	Lake Sumner[a]	9.9	26.2	18.4
	Central North Island[b]	9.8	29.4	28.1

[a] Simmons & Devlin (1981) [b] Groome *et al*. (1983b)

Nugent & Mawhinney (1987, p.33) note that "For nearly a third of the hunters, success [e.g. killing an animal] was of little importance, as they were prepared to continue hunting for 30

or more days without killing a deer. Some of these obviously hunted more for the exercise and outdoor experience than for the satisfaction of killing deer." However, intended future hunting at the site was positively correlated with animals killed per hunt day.

In contrast to these results, Davys *et al*. (1999) found the outdoor experience (26%) to be the second ranking primary motive for tahr hunters, behind the possibility of obtaining a trophy tahr (33%). They also note (page 7) that the "high proportion of respondents who began to hunt thar [sic] after about 1989 suggests that thar [sic] density is an important determinant of hunting interest".

In addition to formal scientific studies, many New Zealand authors have reflected on the motivations for hunting. The role of the outdoor experience is prominent. Lentle and Saxton (1994, p.6) are typical:

> For many New Zealand big-game hunters a goodly portion of the lure of the sport is the experience of being out and about in wild and beautiful places. In alpine hunting, the toughest of New Zealand hunting sports, the quality of the scenic experience rises to the spectacular. The sheer exhilaration of hunting against such a scenic backdrop is surely part of the reason for its popularity.

This theme is echoed by Hunter (2009, p.191):

> When asked why they hunt, New Zealand hunters often give long, rambling answers that reveal complex motivations. They enjoy the physical exercise, the socialising and the honing and maintenance of bush skills, as well as the satisfaction of bringing home meat, and in many cases, of carrying on a family tradition. Most recreational hunters will tell you that the most important part of hunting for them is being in the bush. In recounting hunting trips or major expeditions, descriptions of the bush, the terrain and the views are integral.

Many authors note that killing is of minor consequence. Examples are provided by Caigou (2009), Orman (2002) and, earlier, by Grant & Grant (1972):

> Now, in one sense, hunting as an outdoor pursuit is about getting out into the hills and as such there are justifiable reasons for being there, beyond simply hunting for meat. It's during this outdoor activity that we experience all those other tangible and intangible rewards when we 'go bush'. It's while on our forays and expeditions that we have 'adventures' and these bring about a certain extension to ourselves. We come face-to-face with the environment and the natural realm and we enjoy the myriad of things that are different 'favourites' for each one of us. … There are so many components that go into making a hunting 'experience' and this is why it is hard to isolate any single reason for why we hunt. … At some stage I got to the point where I realised that hunting was really about the hunt, and that the killing at end of it is required, but is not the actual aim. (Caigou, 2009, p. 144-145, 158)

> Don't kill needlessly. Kill selectively leaving hinds for most of the year or all of the year and just enjoy the total experience. You don't have to squeeze the trigger to have a top hunting trip. (Orman, 2002, p.170)

> The truth is that the hunter finds challenge in meeting nature on her own terms … The Hunter's satisfaction, to prove himself in an ancient role, his pride, to take no more than his needs, his achievement, to approach the meaning of Life through identification with the Wild. He lives in harmony with Nature's Law. The whole experience of Stalk is articulate poetry without words, tempered by remorse at the kill. There is no room here for the ghoul who revels in pain, bloodshed, and death. (Grant & Grant, 1972, p.3)

Speedy (cited in Yerex, 2001) reiterates the low importance of killing a deer, but, like Fraser (2000), alludes to the broader social dimensions of hunting:

> For me, hunting is just an excuse to be out in the bush. The hunting experience is not killing animals … It's not a macho thing as some people think … There's something in me that is drawn to the forest, the wilderness, the deer – it's unexplainable. Other deer people will know what I mean. They have the same deep passion in them that they can't explain either, but we know what we mean when we talk to each other. (Speedy, cited in Yerex, 2001).

> Typically, the average hunter of today is motivated more by the opportunity to take home some venison and enjoyment of the outdoor experience (Fraser & Sweetapple 1992; Fraser 1993). However, despite the limited opportunities for taking good trophies, hunting during the roar traditionally remains an important part of many recreational hunters' activities and probably reflects the social aspect of hunting. (Fraser, 2000, pp.9-10).

New Zealand hunters appear to have similar motivations to hunters studied abroad. Their primary motivation is not killing a game animal, but appreciation of game animals is important, as is the whole experience of the hunt, including interactions with nature and development of social ties.

Chapter 4
Satisfactions

Satisfaction as an overall evaluation can be defined as a measure of the quality of a hunting experience – how satisfied the hunter is during and after the experience.

4.1 Constituents of satisfaction

A number of variables have been found to be important to hunter satisfaction, including biological factors, such as deer population and harvest, and human dimensions, such as hunter density and perceived crowding (Heberlein & Keuntzel, 2002). While the variables affecting satisfaction are discussed individually, there are many interrelationships between variables. For example, regulation may affect hunter and/or deer density, which may affect the social aspects of hunting as well as the chances of harvest success. The relationships between these variables and satisfaction are also complex, and vary depending on the goals of the individual hunter. The findings of studies that have examined the importance of a number of variables contributing to hunter satisfaction are as follows.

4.1.1 Harvest success

Harvest success and its relative importance in hunter satisfaction has been examined in a number of studies (Decker & Connelly, 1989; Grilliott & Armstrong, 2005; Fulton & Hundertmark, 2004; Gigliotti, 2000; Collier & Krementz, 2007; Hammitt *et al*., 1989, 1990; Backman *et al*., 2001; McCullough & Carmen, 1982; Cessford, 1987; Groome *et al*., 1983b; Simmons & Devlin, 1981). Although harvest success has traditionally been seen as the most important (or only) variable contributing to satisfaction, it is now understood that the strength of this relationship varies between hunters, and that other variables may be as, or more, important for satisfaction for some hunters (Fulton & Hundertmark, 2004; Gigliotti, 2000; Decker & Connelly, 1989).

In order to investigate the relationship between harvest success and satisfaction further, Gigliotti (2000), and Decker and Connelly (1989) grouped hunters according to their primary motivation for hunting. Both studies found that there was some decrease in the satisfaction levels associated with an unsuccessful hunt or hunting trip, although the level of decrease differed between types of hunters. Gigliotti (2000) asked hunters to rank their satisfaction with their 1997 hunting season experience on a seven point scale, from very dissatisfied (1) to very satisfied (7). The study found that hunters motivated by nature and the social aspects of hunting rated their satisfaction with an unsuccessful hunt as ‘neutral’ (a score of 4), but hunters motivated by meat or a trophy gave a rating of ‘slightly dissatisfied’ (a score of 3).

Decker and Connelly (1989) also found that harvesting a deer was related to a higher evaluation of satisfaction for all hunters, and that being unsuccessful in harvesting an animal led to a less satisfying experience. Hunters were asked to score the effect of both shooting a deer, and not shooting a deer on a 9 point scale from -4 (greatly dissatisfied) to 4 (greatly

satisfied). Hunters motivated by achievement gave the lowest mean satisfaction scores (-1.0) when they were unsuccessful in harvesting an animal, with appreciative and affiliation-oriented hunters giving mean satisfaction scores of 0.5 and 0.6 respectively.

There were also differences in satisfaction levels due to harvest success that could be attributed to the type of animal harvested. Collier and Krementz (2007) found that hunters reported harvesting a mature buck as more satisfactory than harvesting a doe, for example. An earlier study by Gigliotti (2000) had also found that hunters motivated to hunt by solitude, meat or a trophy had higher satisfaction levels when a buck was harvested. Hunters motivated primarily by nature, social aspects or excitement reported similar increases in satisfaction regardless of whether the animal harvested was a buck or a doe (Gigliotti, 2000).

Hunter satisfaction may also be increased if another member of the hunting party is successful in harvesting an animal, even if the individual hunter is unsuccessful. Fulton and Hundertmark (2004) found that success within the hunting party was a strong indicator of satisfaction with the overall hunting experience. A study of South Dakota deer hunters by Backman *et al*. (2001) reported that two-thirds of hunters found success within the hunting party to be an important factor in their hunting satisfaction.

These studies all confirm that there is a relationship between harvest success and satisfaction. However, as hunters are not a homogenous group, the importance of harvest success to individual hunters differs depending on their motivations (Gigliotti, 2000).

4.1.2 Deer signs, deer seen and deer density

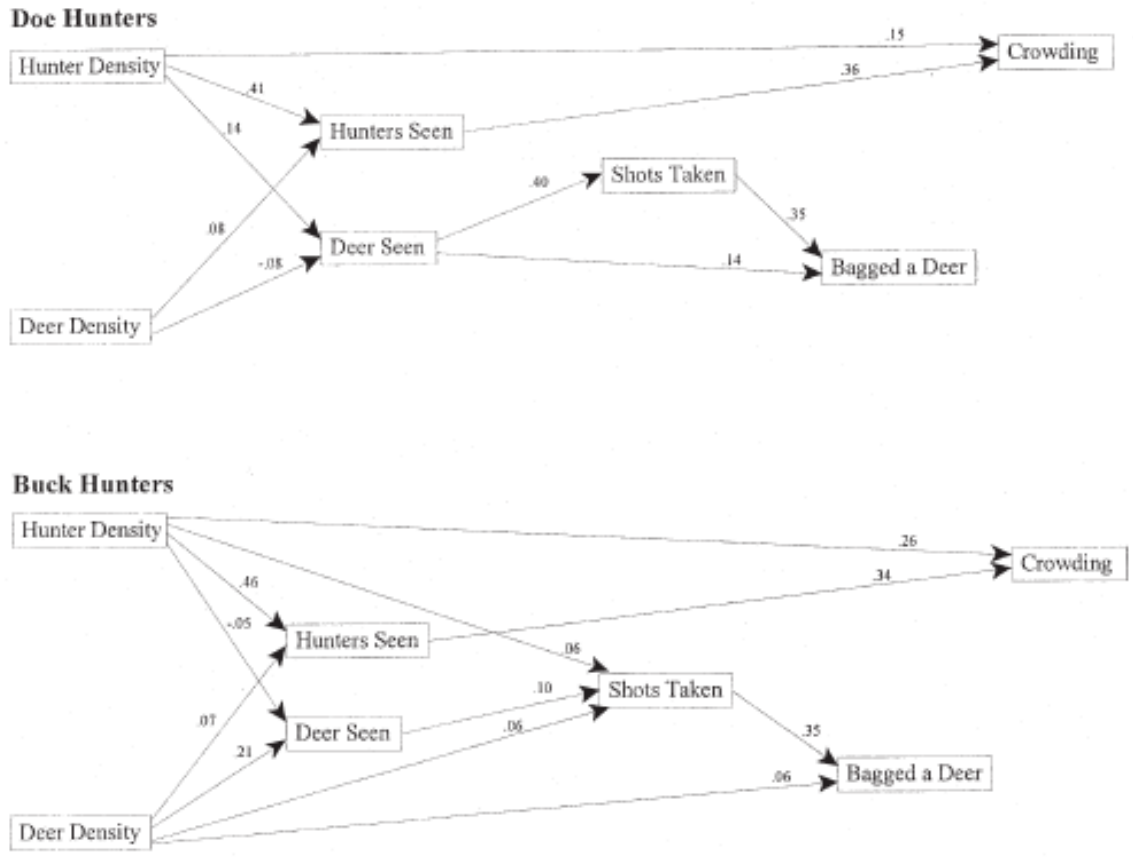
Deer density, deer signs (tracks, faeces, wallows, scrapes, etc.) and deer seen are also variables which have been studied in terms of their impact on hunter satisfaction (Heberlein & Kuentzel, 2002; Collier & Krementz, 2007; McCullough & Carmen, 1982). Gigliotti (2000) refers to these as 'success-related variables', because higher measures of each of the variables are likely to relate to an increase in the **chances** of harvesting an animal which, as discussed above, has some influence on satisfaction. Gigliotti (2000) found that the strongest correlation between hunt satisfaction and eight different attributes was with the number of deer seen for all types of hunters, apart from hunters motivated by solitude who were more focussed on buck quality and the number of bucks seen.

Seeing animals and signs of animals may contribute to an individual's perception of the deer population being adequate and high quality. The perception of herd population has been found to be an important factor for hunter satisfaction by McCullough and Carmen (1982), who explain that it could be important for a number of reasons. The perception of a large herd could be due to a high number of deer seen, which could in turn result in higher harvest rates. Other reasons a perception of large herd size could add to satisfaction are that hunters enjoy seeing deer, and that perceiving the herd as large means that hunters do not need to worry about overharvesting animals and compromising the viability of the herd for future hunting opportunities (McCullough and Carmen, 1982).

Heberlein and Kuentzel (2002) aimed to examine the relationship between deer density and evaluations of both satisfaction and quality and to test whether the relationship was

different based on whether hunters were hunting during a buck hunting season or a doe hunting season. The study found that deer density is important for evaluations of both satisfaction and quality during buck hunter seasons. They argue that higher deer density increases the number of deer seen, shots taken and deer bagged for buck hunters (Heberlein & Kuentzel, 2002). This relationship is depicted in Figure 2. There was no relationship found between deer density and satisfaction for doe hunters, for whom it was hunter density that led to an increase in deer seen, shots taken and satisfaction. The relationship between hunter density and satisfaction described by Heberlein & Kuentzel (2002) is discussed further in the following section.

Figure 2
The relationship between human and biological dimensions of the hunting experience for buck and doe hunters.
(Figure 1 In Heberlein & Kuentzel, 2002)



4.1.2 Hunter density/perceived crowding

"*Density is an objective measure of the number of people per unit area, while perceived crowding is a negative evaluation of a particular density level in a particular setting. Crowding, then, is both subjective and situation- specific*" (Shelby & Heberlein, 1986:62)

The relationship between the objective measure of hunter density, the subjective measure of perceived crowding, and satisfaction is complex, and dependent on the goals of the hunter (Gigliotti, 2000; Heberlein & Kuentzel, 2002). Gigliotti (2000) found that the correlation between a high level of perceived crowding and satisfaction was strongest with meat hunters, and explains that a possible reason for this is that hunters motivated to harvest an animal for meat may hunt in areas with easier access, higher deer numbers, and most probably higher hunter density than more remote hunting areas.

As well as the impacts of deer density addressed in the previous section, Heberlein and Kuentzel (2002) also examined the relationship between hunter density and satisfaction for buck and doe hunting seasons. Their study showed a complex relationship between hunter density and satisfaction, moderated by sightings of both hunters and deer and by the number of shots taken, depicted in Figure 2. The main findings were that high deer density (but not hunter density) is important for satisfaction and quality in the buck hunting seasons. However, hunter density is important in doe hunting seasons. Increases in deer density (bucks) and hunter density (does) cause an increase in deer seen, shots taken and deer bagged in their respective seasons (Heberlein & Keuntzel, 2002). While increased hunter density in doe hunting seasons does increase perceived crowding, which has a negative effect on satisfaction, this is offset by the increase in satisfaction due to increased deer seen, shots taken and deer bagged.

4.1.3 Herd quality

Herd quality has been found to be an important factor in hunter satisfaction in a number of studies (Collier & Krementz, 2007; Fulton & Hundertmark, 2004; Mangun *et al*., 2007). Herd quality was one of the recurring themes that emerged from a qualitative study of Kentucky hunters, with participants commenting on the importance for hunter satisfaction of quality of bucks in a herd (Mangun *et al*., 2007). Collier and Krementz (2007) found that the most important determinant of hunter satisfaction was knowing that the opportunity to harvest a buck exists, based on the hunter's evaluation of herd quality and size.

Backman *et al*. (2001) examined the impact of a change in the management system for the Black Hills deer herd, which aimed to change herd structure in order to provide larger numbers of mature bucks. The decrease in licences available had the potential to impact on the social nature of hunting. Although both resident and non-resident hunters reported their primary reason for hunting in the area as 'social', hunter satisfaction did not decrease under the new management regime, showing that an increase in mature bucks available to hunters may substitute for any reductions in the social aspect of hunting (Backman *et al*., 2001). The possible effects of regulation on hunter satisfaction are discussed further in the next section.

4.1.4 Regulation

Fulton & Manfredo (2004) found support for four hypotheses about the role that regulatory changes have in affecting hunter satisfaction.

- Regulations decreasing hunting opportunity will decrease satisfaction.
- Beliefs about outcomes of regulations change with direct experience of regulations.

- Positive beliefs about regulations lead to positive attitudes towards regulations, harvest success increase and increased satisfaction.
- Negative beliefs about regulations leads to increased perceptions of regulatory and other constraints.

Heberlein and Kuentzel (2002) also examined the effect of regulation on hunter satisfaction, as discussed earlier. They found that different season frameworks (buck or doe hunting seasons) attract hunters with different motivations, and that the conditions for a satisfying hunting experience will vary between these groups of hunters.

4.1.5 Time with friends and family

While this has consistently been ranked as an important motivation for participating in hunting, only one study found that it was ranked as an important factor (ranked number four) for hunter satisfaction (Fulton & Hundertmark, 2004). Comments by participants in a study by Duda *et al*. (1995) did, however, focus on the importance of friends and family to their satisfaction with the hunting experience.

4.1.6 Enjoying the outdoors

Enjoying the outdoors has been ranked as a highly important factor in hunter satisfaction. Enjoying the outdoors was ranked as the most important factor in Fulton and Hundertmark's study (2004), and Hammitt *et al*. (1989) found that the variable relating to the outdoors experience had the strongest correlation with a satisfying hunting experience. The study examined the importance of a number of variables and their correlation with satisfaction with a specific hunting experience (hunting at the Big South Fork National River and Recreation Area in Tennessee), rather than with hunting as a recreational activity (Hammitt *et al*., 1989).

4.1.7 Seeing other wildlife

Although only identified as a factor affecting hunter satisfaction in one study, seeing wildlife other than the species hunted was ranked third by participants in Fulton and Hundertmark's study (2004).

4.2 New Zealand

There has been limited research into New Zealand hunter satisfactions. Like North America, seeing deer signs and the number of deer seen are very important aspects of hunter satisfaction (Simmons & Devlin, 1981; Groome *et al*., 1983b; Cessford, 1987). Seeing deer and signs of deer were both scored as more important than killing a deer in studies by Simmons & Devlin (1981), Groome *et al*. (1983b) and Cessford (1987). Seeing fresh signs of deer was given an average importance score in the range 70-78 for day hunting trips (0 being not important and 100 being essential), and approximately 80 for multi-day trips. Seeing deer was scored as slightly less important, scoring approximately 70 for day hunting trips and 80 on multi-day hunting trips (Simmons & Devlin, 1981; Groome *et al*., 1983b).

Scenery was the most important source of satisfaction for Greenstone/Caples hunters, followed by seeing game, success, facilities and peace/solitude (Cessford, 1987). Whereas only 1 percent of Cessford's respondents nominated the quantity of game as a source of satisfaction, low game abundance was the most noted source of dissatisfaction (28% of responses), followed by high use levels and inconsiderate or illegal behaviours. The important role of game numbers in dissatisfaction is particularly noteworthy when attention is focussed on the least satisfied hunters. Cessford notes:

> "Further insight into hunter satisfactions was gained from the 30 percent of hunters whose expectations were at best only achieved a little. While their sources of satisfaction differed little from those of other hunters, their sources of dissatisfaction were different. Low game/fish numbers were stated by 63 percent of these hunters, while the figure for all hunters was only 28 percent. This suggests that for these hunters, success was a particularly important but relatively unfulfilled requirement of their hunting experiences." (Cessford, 1987, p.111).

Cessford (1987) asked hunters to nominate the recreation area management factors requiring attention. By far the most common response was "deer numbers", which entailed 35 percent of all responses to this question. Seventy five percent of hunters wanted higher deer numbers and none wanted reduced deer numbers (Cessford, 1987, p.119). Reasons offered for desirability of increased deer numbers included improved hunting success (25%), encourage hunting (20%) and improved trophy potential (9%).

Chapter 5
Hunting Participation

This section provides an overview of studies that have attempted to measure the frequency of hunting participation. The number of studies undertaken in this area varies greatly between countries, with most information from North America.

5.1 North American hunting participation

The United States Fish and Wildlife Service (USFWS) has undertaken surveys of recreational hunters since 1955 (Sharp & Wollscheid, 2009) at approximately five yearly intervals, with the most recent being administered in 2006 (USFWS, 2007). Big game hunting is the most popular type of hunting in the United States, with an estimated 10.682 million participants during 2006 (USFWS, 2007). The vast majority (95%) of big-game hunters were hunting for deer - a total of 10.062 million people (USFWS, 2007). A total of 164 million days of big-game hunting took place during 2006 (132 million days deer hunting), with an average of 15 days hunted (13 days deer hunting) per participant (USFWS, 2007). The national hunting participation rate for people 16 years and older in 2006 was 5.46 percent[3], varying from 2 percent in the Pacific States (Alaska, California, Hawaii, Oregon and Washington) to 12 percent in the West North Central States (Kansas, Iowa, Minnesota, Missouri, Nebraska, North Dakota and South Dakota) (USFWS, 2007). Big game hunting is a significant proportion of total hunting effort, with a national participation rate for people 16 years and older of 4.66 percent[4], ranging from 2 percent to 9 percent by region.

The vast majority of hunters in the United States are male, a total of 91 percent of all hunters. The largest group (24%) of hunters were aged between 35 and 44 years old, with participation declining as age increased (USFWS, 2007). The majority of hunters (52%) reported incomes of $50,000 or more, in comparison with 37 percent of the United States population as a whole. A larger percentage of the general United States population did not report annual household income (25% compared to 13% of hunters) however, which may affect this comparison. Hunter education levels were similar to national education levels, although slightly more hunters had completed 12 years of education (39% of hunters and 34 percent of the United States population), and slightly fewer hunters had completed 4 years of more of college (21% of hunters compared with 27% of total population) (USFWS, 2007).

The data from the USFWS surveys for the period 1980–2006 have been analysed by Schuett *et al*. (2009) in order to identify trends in participation. They found that overall: the number of people participating in hunting is declining, with the national hunting participation rate falling from 10 percent in 1980 to 5 percent in 2006. When hunting participation numbers are broken down by hunting type, the trend is different for big-game hunting, for which hunter numbers have not changed significantly since 1996 (USFWS, 2007). Schuett *et al*. (2009) also found that the number of younger people (34 and under) participating in

3 The implied total population rate is 4.27%. In July 2006 78.26% of the US population was 16 years or older (US Census Bureau, 2007).

4 The implied total population rate is 3.65%.

hunting has decreased significantly. The possible reasons for these trends will be discussed in a later section.

The Canadian federal agency responsible for hunting is the Canadian Wildlife Service, and, together with Environment Canada, it has undertaken surveys on 'The Importance of Nature to Canadians' at approximately five yearly intervals between 1981 and 1996 (Sharp & Wollscheid, 2009). A total of 1.2 million Canadians participated in hunting during 1996, taking an average of 12.7 trips per hunter. The majority of hunters (72%) were hunting for large mammals (Filion *et al*., 1999). The national hunting participation rate in 1996 was 5.1 percent, varying from 3.2 percent in British Colombia through to 15.1 percent in Newfoundland (Filion *et al*., 1999).

Hunting is predominantly a male activity in Canada, although 15 percent of hunters are female, considerably higher than in the United States (Sharp & Wollscheid, 2009). Participation in hunting is highest in the 25-54 age group, (27.3% of hunters, compared to 21.4% of the Canadian population as a whole). 32 percent of hunters had a post-secondary school certificate or diploma (compared with 24.6 percent of the Canadian population). The majority of hunters (64.7%) reported incomes over $20,000, compared to 45.6 percent of the Canadian population as a whole (Filion *et al*., 1999). The total number of hunters in Canada declined during the period 1991-1996, as did the national participation rate, which fell from 7.3 percent to 5.1 percent (Sharp & Wollscheid, 2009).

Payne (1989) compiled estimates of game species populations and harvest numbers for species hunted throughout North America in the early 1980s (Table 10). Hunters were responsible for taking a significant proportion of several North American species, including one third of the black-tailed deer population.

Table 10
Population and harvest for large game species hunted in North America (Payne, 1989)

Species	Species population (000)	Species harvest (000)	Percent of species population harvested
White-tailed deer	15,000	2,982	19.9%
Black-tailed deer	1,500	500	33.3%
Pronghorn antelope	400	87	21.8%
Elk	500	85	17.0%
Moose	900	54	6.0%
Caribou	2,652	50	1.9%
Mountain sheep	120	1.3	1.1%
Mountain goat	70	2.2	3.1%
Bison	70	10	14.3%
Muskoxen	60	0.3	0.5%
Peccary		27.5	
Total		**3,759**	

5.2 Australian hunting participation

Responsibility for the management of game animals and hunting lies with state governments, and regulations vary throughout Australia. Few studies have measured Australian hunter participation; however, Bauer & Giles (2000) report that approximately 900,000 Australians (5% of the population) participate in some type of hunting. Cause (1990, cited in Cause 1995) estimated total Australian deer hunting participation to be about 17,500 hunters, with 10,000 of those in Victoria. Opportunities for participation are limited because of the small numbers and sizes of deer herds available for recreational hunting (McLeod, 2009; Moriarty, 2004).

The Victorian Government has undertaken a number of annual hunter surveys, with the most recent being administered during 2006 and 2007. At the time of the 2006/7 survey there were 14,710 licensed deer hunters in Victoria, which is approximately 0.3 percent of the state population (ABS, 2009; DSE, 2008). The majority of hunters surveyed were male (98.6%).

A study of licensed New South Wales hunters undertaken in 2005 (Kroezen, 2005) provides an estimate of hunter numbers by species (Table 11). The vast majority (98%) of hunters were male, and the largest groups of hunters were aged between 35-44 (23%), 45-54 years (27%) and 55-64 (22%).

Table 11
Licensed game hunter numbers by species – New South Wales 2005
(adapted from Kroezen, 2005)

Species hunted	Percent of licensed large game hunters pursuing this species	Estimated total number of NSW licensed hunters pursuing this species
Feral Pig	42.3	1679
Deer	23.4	929
Feral Goat	23.0	913
Wild Dog	13.0	516
Kangaroo	12.9	512
Total	**100.0**	**3970**

Totals do not match the sums for individual species because hunters are not restricted to a single species

5.3 Hunting participation elsewhere

European hunting participation rates are highly variable. Bauer & Giles (2002, p.30) report hunter densities approaching 5 hunters km^{-2} in Italy, but fewer than 0.5 hunters km^{-2} in other European countries, and hunting participation rates as high as 4-6 percent of the population in Scandinavia. Broberg (2010) reports in 2004 15 percent of Swedes between the ages of 18 and 84 claimed to be hunters.

The Federation of Associations for Hunting and Conservation of the EU (FACE) represents national hunter associations in 36 European countries and provides estimates of hunting participation for member states (FACE, 2010). Of the 34 countries for which data are

available, FACE identifies over 7.3 million hunters. The average hunting participation rate is 1.23 percent, ranging from 0.16 percent in the Netherlands to 8.54 percent in Ireland.

European game harvests are a significant proportion of the total populations for some species. Bauer & Giles (2002) cite evidence of 1989 harvest rates for red deer of 6.1%, saiga 8.1%, reindeer 14.3%, roe deer 4.8%, and moose 10.7%.

Ueda et al. (2010) report that there were 166,386 licensed Japanese hunters in 2005, a decline from a peak of 532,265 in 1970, but do not state which species are hunted. While sika deer are mentioned, other species must be included in the total because a small proportion of permits authorise air rifle hunting. Licences for hunting with traps were a minor component of the total in 1970, but are much more prominent in recent times. The types of traps are not identified in the paper. The total population of Japan in 2005 was 128 million, suggesting a hunting participation rate of about 0.13 percent, although this varied dramatically by prefecture. The prefecture of Kochi had the highest gun hunting participation rates in both 1965 (9.6% of people older than 20 years) and 2005 (8.6%) (Ueda et al., 2010).

5.4 Factors affecting participation

Studies have examined influences on hunter participation throughout the United States, Canada, Europe and Russia (Boxall, *et al*., 2001; Needham *et al*., 2005; Bissell *et al*., 1998; Enck *et al*., 2000; Poudyal *et al*., 2008; Heberlein *et al*., 2002; Heberlein *et al*., 2009). The factors found to have the strongest influence on hunter participation are: living in a rural area, being male, family involvement in hunting, and being introduced to hunting at a young age by the hunter's father or a father figure. Family involvement also has a strong positive association with length of time involved with hunting (Heberlein *et al.*, 2002; Bissell *et al*., 1998; Enck *et al*., 2000).

There is a strong relationship between the percentage of the population living in rural areas and the number of hunters in the area for the United States, Canada, Europe and Russia (Heberlein *et al*., 2002; Heberlein *et al*., 2009). This has been attributed to both opportunities to hunt (Boxall *et al*., 2001; Heberlein *et al*., 2002) and the lifestyles and culture associated with living in rural areas (Enck *et al*., 2000; Heberlein *et al*., 2002).

The increasingly urban population of North America has been linked to decline in hunter numbers (Poudyal *et al*., 2008; Enck *et al*., 2000). This has been attributed to the change in lifestyle and culture associated with moving from rural areas to urban areas, a decreasing amount of rural dwelling young people available for recruitment into hunting, habitat conversion, and decreasing access to public lands (Poudyal *et al*., 2008; Boxall *et al*., 2001).

A trend in hunter demographics that has the potential to negatively impact on the number of hunters in the future is the decreasing number of young hunters recruited into the sport, and the increasing age of hunters overall, which will lead to smaller numbers of hunters as older hunters retire (USFWS, 2007; Boxall, *et al*., 2001; Fraser & Sweetapple, 1992; Enck *et al*., 2000).

Animal health has the potential to have a negative influence on hunter participation. Chronic wasting disease (CWD) is a neurological disease affecting deer, elk and moose across fourteen American states, and two Canadian provinces (Vaske *et al*., 2009). Although there is currently no evidence that the disease may be transmitted to humans, the discovery of CWD among animals in Wisconsin was found to have directly contributed to a decline of approximately 5 percent of state hunting licence sales (Vaske *et al*., 2004). Other studies have shown that hunter participation is likely to fall more drastically (38-52%) if the rates of CWD infection of animals increases to 50 percent (Needham *et al*., 2004; Needham *et al.*, 2005).

Other factors having a negative influence on hunter participation include the changing ways in which people spend their leisure time (Brown *et al*., 2000), and decreasing access to private land for hunting (Brown & Messmer, 2009).

5.5 New Zealand hunting participation

Few studies have attempted to measure New Zealand hunting participation. Participation estimates may be derived from a number of data sources, including surveys, firearms permits, hunting permits and club memberships.

5.5.1 Surveys

Responses to a national survey undertaken in February 2008 by Hughey *et al*. (2008) indicated that 5.7 percent[5] of the New Zealand registered voter population claimed they had hunted for big game[6] over the previous year, with a mean of 12.31 days hunted annually by those who were active. This participation rate estimate is equivalent to 170,000 big game hunters[7]. Making the bold (and patently incorrect) assumption that there are no big game hunters under the age of 18 years yields a lower bound estimate of the total population big game hunting participation rate of 4.0 percent. The Hughey *et al*. (2008) data estimate an overall hunting participation rate for any species of 16.6 percent[8], equating to 494,000 hunters[9,10].

Hughey *et al*. (2008, pp.62-63) note their recreation activity participation rates are high compared with other data. Potential causes of inflated estimates include recall bias and respondent self-selection because of the survey topic (Environmental Perceptions), which may have resulted in bias towards respondents with interests correlated with outdoor activities. In the extreme case, if all non-respondents were non-hunters the big game hunting participation rate of the sample would have been 2.3 percent (approximately 68,000 big game hunters). The lower bound big game hunting participation rate for the population would be 1.6 percent under both assumptions of (zero participation by non-respondents and zero participation by those aged under 18 years).

5 Standard error = 0.8%

6 Hughey *et al*. defined big-game as: deer, pigs, goats, chamois, tahr and wallabies.

7 95% confidence interval (120,000 ~ 220,000)

8 Standard error = 1.4%

9 95% confidence interval (415,000 ~ 573,000)

10 Total population participation rate of 11.6% assuming no hunting by those under 18 years of age.

While the Hughey *et al*. (2008) participation estimates appear high for all activities, the information on relative rates of participation provides another avenue for estimating big game hunting participation rates compared to a known base, in this case freshwater fishing and game bird hunting licences issued by Fish & Game New Zealand. There were 0.339 self-identified big game hunters for every freshwater fisher[11] and 0.915 big game hunters for every game bird hunter[12]. In 2007, Fish and Game New Zealand issued 95,547 adult and family fishing licences and 32,821 game bird licences (Sowman, *pers. comm*.). Making allowance for sales to foreigners yields estimates of 82,890 fishing licence sales to adult New Zealanders (Unwin, 2009)[13], and 32,565 game bird licence sales to adult New Zealanders in the 2007/8 season (Wray, *pers. comm*.)[14]. However, these are lower bound estimates of participation in each of these activities. In addition to licensed freshwater fishers there are other participants, including family licence secondary adults[15], Central North Island licence holders[16], landowners and their partners/spouses who are entitled to fish on their own properties without a licence, people fishing for species for which a licence is not required (e.g. whitebait, eels, koura), and unlicensed anglers who do not fit any of those categories. As with fishing, landowners and partners/spouses are able to hunt game birds on their own property without a licence. Lower bound estimates of big game hunting participation in 2007 based on fishing participation is 28,100 hunters[17], and based on game bird hunting is 29,800 hunters[18].

Earlier, in the most comprehensive hunter-focussed study undertaken in New Zealand, Nugent (1992) surveyed licensed firearm owners and estimated that 3.5 percent of the adult New Zealand population hunted during 1988 (117,200 hunters), with 41 percent of those hunting for big game[19] (48,000 hunters). Big game hunters were 1.4 percent of the population and averaged 18.4 hunting days per year.

The terms “hunting” and “shooting” are often used interchangeably in common language, even though shooters need not hunt and hunters need not shoot[20]. This leads to difficulty in interpreting some survey results. In a New Zealand wide study, Cushman *et al*. (1991) asked a random sample of people 15 years and older to identify the favourite leisure activities that they had participated in within the previous four weeks. Surveys were distributed monthly from April 1989 to May 1990. Up to five favourite activities could be nominated. The group “hunting/shooting” was identified as a favourite leisure activity in the previous four weeks by 7 percent of adult male New Zealanders (3% of the total adult population), providing an upper bound to the proportion of the survey population for whom large game hunting was a

11 95% confidence interval (0.239 ~ 0.382).

12 95% confidence interval (0.607 ~ 1.061).

13 Unwin (2009) records 13.2% of adult licence sales to overseas residents.

14 Wray (pers. comm.) reports 99.22% of 2009 gamebird licence sales were to New Zealand residents.

15 Unwin (2009) notes 1.49 anglers per licence for 20,148 family licences.

16 Licences to fish in the Central North Island are issued by the Department of Conservation.

17 95% confidence interval (19,800 ~ 31,700).

18 95% confidence interval (19,800 ~ 34,500).

19 Nugent defined big-game as: deer, pigs, goats, chamois and tahr.

20 Hunting for game birds and small game is typically referred to as “shooting” (See, for example, Perkins, and Gidlow (undated)). Big game hunting too is often referred to as shooting, as indicated by the many web pages referring to “deer shooting” and even book titles (e.g. McNair (1971), Thomson (1964)).

favourite activity in the previous 4 weeks. This result is broadly consistent with Hillary Commission Sport and Physical Activity in-home interviews of people 18 years and older conducted in 1997, 1998 and 2000 (van Aalst *et al*., undated). The Hillary Commission surveys identified 11 percent of males (137,700 men) and 6 percent of all adults (157,000 people) engaged in "shooting". Shooting ranked as the activity with the 6th most participants for men and 10th for women. For the 4 week period prior to undertaking the survey, the same period used in the Cushman *et al*. (1991) study, 3 percent of the population 18 years or older (75,800 people) had participated in shooting.

SPARC (formerly the Hillary Commission) interviewed a national sample of 4,443 people 16 years of age and over in 2007/2008 (SPARC, 2009). The potential for confusion between hunting and shooting was reduced in this survey because it included the categories "hunting" and "deer stalking / pig hunting", as well as "shooting". The survey estimated 150,343 hunters of any species, 4.6 percent of the population 16 years or older[21]. Only 0.3 percent of the population (10,118 people) identified themselves as pig hunters and/or deer stalkers (Hohepa, *pers. comm*.). The SPARC estimates suggest that only 6.7 percent of all hunters hunt deer or pigs, compared with estimates of 41 percent by Nugent and 34 percent by Hughey *et al*.. It is notable that participation in shooting (rifle & pistol) fell to 3.0 percent in the SPARC survey (101,712 participants), compared with 6 percent (157,000 people) in 1997-2000.

5.5.2 Firearm permits

Simmons and Devlin (1981) and Groome *et al*. (1983a) surveyed firearm owners about hunting participation, finding that 48 percent and 67 percent, respectively, defined themselves as current hunters of any species. These data result in estimates of hunting participation for any species of 6.6 percent for Christchurch City and 6.0 percent for the combined Auckland, Rotorua and Hawke's Bay local government regions. It should be noted that firearm permit surveys exclude a potentially significant proportion of the hunter population, including people who hunt with firearms under supervision of others (frequently family members), and those who hunt without firearms, including pig hunters and bow hunters.

There are currently about 223,000 firearm licence holders in New Zealand, with very little annual variation, and the total number of licence holders has been reasonably static since 1993 (Green, *pers. comm*.). If the same proportion of active hunters of any species applied today as when the Simmons *et al*. (1981) and Groome *et al*. (1983) surveys were undertaken there would be about 107,000 to 149,000 active hunters in New Zealand (2.4% - 3.4% of the total population[22]). The upper bound is similar to the SPARC estimate. It should be noted, however, that the ratio of active hunters to firearm licence holders is not fixed. For example, the ratio could decline if hunters ceased hunting but retained their firearms licences (which are valid for 10 years), or if there were an upsurge in activity in non-hunting firearms-related activities, such as arms collecting or target shooting. For example, Thorp (1997, p.42)

21 95% confidence interval (3.6 ~ 5.6%). This is equivalent to a total population participation rate of 3.6% if it is assumed that no one under the age of 16 years hunts (The NZ Department of Statistics estimated that 77.2% of the population was aged 16 years or older at 30 June 2006, based on NZ census data, www.stats.govt.nz).

22 The New Zealand population on 22 April 2010 was estimated as 4,365,078 people (Statistics New Zealand, 2010)

presents evidence of strong growth in pistol users, which may have resulted in a lower hunting participation rate amongst firearms licence holders. It should be noted, however, that this particular effect is likely to be extremely small because pistol permit holders represented only about 1 percent of all firearms licence holders, and some pistol users are also hunters.

5.5.3 Club membership

The most prominent organisation representing big game hunters in New Zealand is the New Zealand Deerstalkers' Association (NZDA). However, the NZDA represents a minority of hunters, with estimates of the NZDA membership rate for two hunting sites in the early 1980s being 18 percent and 26 percent of big game hunters at those sites (Simmons and Devlin, 1981; Groome *et al*., 1983a). At the time of Nugent's study, which estimated big game hunting participation at 48,000 hunters (Nugent 1992), NZDA membership was about 5,000 (Yerex, 2001; Dignan & Cessford, 2009), indicating the national NZDA membership rate at that time was about 10.4 percent of big game hunters. The 7,500 members of NZDA in 2009 (Dignan & Cessford, 2009) equate to 29,000 – 72,000 contemporary big game hunters, based on the range of previous membership proportions. Davys *et al*. (1999) report that 57 percent of tahr hunter survey respondents belonged to a hunting club or outdoor organisation, but do not report what fraction of those were NZDA members.

5.5.4 Hunting permits

Data from a variety of sources attests to the popularity of big game hunting in specific regions. For example, the Tokoroa Pig Hunting Club has over 1,000 members (Ottmann, *pers. comm*.), while the ballot for access to 25 wapiti blocks for two 14 day periods during the bugle[23] attracted 1,200 applicants in 2010 (Sloan, *pers. comm*.), of whom 269 (79 parties) were successful (FWF, 2010). About 2,000 hunters obtain permits to hunt on Stewart Island Conservation land each year and there is unsatisfied demand for permits at some times of the year (NZDA, undated). Nugent (1988) identified 1,284 different people who hunted in the Blue Mountains (Otago) in 1984/5, a very small hunting area, mainly of local interest, during a period of low deer numbers. Over two different 18 month periods 2,845 big game hunting permits were issued for Lake Sumner Forest Park (November 1979 to May 1980: Simmons and Devlin, 1981), and 14,940 big game hunting permits were issued for the Kaimanawa and Kaweka Forest Parks (April 1980 to September 1981: Groome *et al.*, 1983a). In both cases individual hunters could obtain multiple permits within these periods, so the number of permits issued is greater than the number of individuals who hunted in each location.

A hunting permit is a legal requirement to hunt on land administered by the Department of Conservation, although many hunters fail to comply with that requirement – Fraser (2000) estimated 50-90 percent permit compliance. It is not necessary to obtain a Department of Conservation hunting permit to hunt on private land or pastoral lease, which requires permission from the occupier. Department of Conservation permits are issued under a variety of systems, depending on the conservancy. Canterbury, West Coast, Otago and Southland conservancies issue annual permits to individual hunters. The number of annual

23 The call made by wapiti bulls during the mating season is referred to as a bugle. The term 'the bugle' refers to the mating period.

permits issued is less than the number of individuals legally entitled to hunt on Department of Conservation-administered land in those conservancies each year because some locations and periods require separate permits, some of which are balloted because of excess demand.

For the 12 month period May 2009 to April 2010, Otago Conservancy issued 2,077 annual permits and Southland issued 4,200 (Beaven, *pers. comm.*). For the year commencing 24 December 2008, Canterbury Conservancy issued 4,513 permits (Smeaton, *pers. comm.*). These three South Island conservancies alone issued over 10,700 annual permits, and there were a further 2,000-3,000 six-month permits issued in Nelson/Marlborough to over 1,000 individual hunters (Beaven, *pers. comm.*)[24]. While there is some overlap because some individuals obtain permits from more than one conservancy, these figures suggest the SPARC participation estimate is significantly downward biased.

A rough upper bound on the rate of South Island (excluding West Coast) hunters obtaining Department of Conservation annual hunting permits is provided by the total of six-month permit numbers for Nelson/Marlborough and annual permit numbers for the other South Island conservancies. The total of 13,790 permit holders is comprised of South Island hunters, North Island hunters and international visitors, with some hunters obtaining permits for more than one conservancy. If all permitted hunters were South Island residents who obtained a permit in only one conservancy, the participation rate would be 1.45 percent, or 1.79 percent for residents 15 years and older[25]. These rates would be higher if West Coast Conservancy permits were included[26]. Extrapolating to the whole country yields an upper bound estimate of 63,000 Department of Conservation permitted hunters. Recall, however, that there is a significant level of non-compliance so this is not an upper bound on numbers of hunters on Department of Conservation administered land. Further, many hunters legitimately hunt on private land.

5.5.5 Trends

There is some evidence of a decrease in hunting activity in the 1990s (Thorp, 1997, p.41). However, some recent evidence suggests growth in hunter participation. The 4,513 permits issued in the Canterbury conservancy in 2009 is significantly more than the 2,499 permits issued in the year commencing 24 December 2001 (Smeaton, *pers. comm*.), which is 81 percent growth over a seven year period. This growth pales into insignificance when compared with applications for Wapiti bugle blocks, which are currently about ten times what they were a decade ago (Sloan, *pers. comm*.).

5.5.6 NZ participation summary

Table 12 summarises results from studies that have estimated or allow derivation of estimates of hunting participation without regard to species hunted. Table 13 includes the

24 The other South Island conservancy (West Coast) also issues annual permits that cover the whole conservancy, but does so from nine separate offices and does not keep a central register. Consequently, West Coast Conservancy permit data have not been included here.

25 At 30 June 2009 the South Island population was 1,027,500 people, 834,900 of whom were 15 years of age or older. Corresponding national figures were 4,315,800 and 3,424,600 (www.stats.govt.nz).

26 The Hokitika office alone issued 462 permits in 2009/10, resulting in a South Island-wide participation rate of 1.42% without including permits issued at the other eight West Coast conservancy offices (Asplin, *pers. comm*.).

few studies that have addressed big game hunting specifically. Whilst diverse, these estimates are all within the range experienced in western countries (Sections 5.1 – 5.3). The United States, Canada and Australia all have total population hunting participation rates between 5.0 percent and 5.5 percent, although there is a broad range of rates within countries, with the New Foundland rate over 15 percent and several American states over 12 percent. Overall, Europe's hunting participation rate is 1.23 percent, although it is much higher in some countries (Sweden, 15%, Ireland 8.5%). Japan too shows great diversity, with a national hunting participation rate of only 0.13 percent, but 8.6 percent in Kochi Prefecture.

Table 12
New Zealand Hunting Participation (any species)

Survey sample	Measure	Participation	Reference
Population-related measures			
Christchurch City firearms licence holders	Percent of ***total Christchurch City population*** who hunt any species	6.6% ¥	Simmons & Devlin (1981)
Auckland, Rotorua, Hawkes Bay firearms licence holders	Percent of ***total regional population*** who hunt any species	6.0% ¥	Groome *et al*. (1983b)
NZ Licensed Firearm Owners	Percent of the ***total NZ population*** who hunted for any species 1988. N = 117,300 ± 6,330	3.5% ¥	Nugent (1992)
NZ Residents 18 years+	Percent of the ***total NZ population*** who hunted for any species in 2007 (assumes no hunting by under 18 years). N = 494,000 ± 79,000	11.6% (SE = 1.2%)	Hughey *et al*. (2008)
NZers 16 years+	Percent of the ***total NZ population*** who hunted for any species in the previous 12 months (assumes no hunting by under 16 years). N = 150,343± 33,000	3.5% (±0.7%)	SPARC (2009)
Sample-related measures			
Christchurch residents 16 years+	Percent of the ***sample*** who had participated in "hunting and shooting" in the previous year	8%	Neighbour (1973)
Auckland Residents 16 years+	Percent of the ***sample*** who had participated in "hunting and shooting" in the previous year	7%	ARA (1973)
Wellington residents (age unknown)	Participation in 'hunting animals only'	4%	Henderson & Stagpoole (1974) #
NZ Residents 15 years+	Percent of the ***sample*** for whom hunting/shooting is a 'favourite' leisure activity during the past 4 weeks	3%	Cushman *et al*. (1991)
Waikato residents 18 years+	Percent of the ***sample*** who hunted for any species	≈ 15%	Fitchman (2007)
NZ Residents 18 years+	Percent of the ***sample*** who hunted for any species in 2007. N = 494,000 ± 79,000	16.6% (SE= 1.4%)	Hughey *et al*. (2008)
NZers 16 years+	Percent of the ***sample*** who hunted for any species in the previous 12 months. N = 150,343± 33,000	4.6% (±1.0%)	SPARC (2009)

Cited in Aukerman & Davison (1980, p. 123), sample selection criteria unknown
¥ Excludes hunters without firearm licences (some pig hunters, bow hunters, supervised firearm hunters, unlicensed firearm users)

There is little New Zealand or international evidence on participation levels in big game hunting. The New Zealand evidence is presented in Table 13.

Table 13
New Zealand Big Game Hunting Participation Rates

Sample	Measure	Participation	Reference
Population-related measures			
NZ Licensed Firearm Owners	Percent of the ***total NZ population*** who hunted for big game species in 1988. N = 48,093	1.4% ¥	Nugent (1992)
NZ Residents 18 years+	Percent of the ***total NZ population*** who hunted for big game in 2007 (assumes no hunting by under 18 years). N = 170,000	4.0% (SE= 0.7%)	Hughey *et al*. (2008)
NZ Residents 18 years+	Lower bound participation in big game hunting for the ***total NZ population,*** based on fishing licence sales N = 28,100	0.95%	This study
NZ Residents 18 years+	Lower bound participation in big game hunting for the ***total NZ population,*** based on gamebird licence sales N = 29,800	1.00%	This study
NZers 16 years+	Percent of the ***total NZ population*** who hunted for deer/pigs in the previous 12 months (assumes no hunting by under 16 years). N ≈10,100	0.23%	SPARC (2009)
DoC annual permit records	**Maximum** rate of DoC annual permit acquisition for the **total South Island population, excluding the West Coast**. N ≈ 13,790	1.45%	This study
NZDA membership	Percent of the ***total NZ population*** who hunt for big game. N = 29,000 ~ 72,000	0.67 ~ 1.67%	This study
Sample-related measures			
NZ Residents 18 years+	Percent of the ***sample*** who hunted for large game in 2007. N = 170,000	5.9% (SE= 0.8%)	Hughey *et al*. (2008)
NZers 16 years+	Percent of the ***sample*** who hunted for deer/pigs in the previous 12 months. N ≈10,100	0.3%	SPARC (2009)

¥ Excludes hunters without firearm licences (some pig hunters, bow hunters, supervised firearm hunters, unlicensed firearm users)

These estimates are quite diverse. The total population rate estimates are relatively low compared with North American rates. The overall United States big game hunting participation rate is 4.7 percent of the total population (ranging from 2% to 9% for different regions), and the Canadian average is 3.7 percent.

There are marked differences in estimates of New Zealand big game hunting participation. Based on evidence they present about known participation levels in other activities relative to their own estimates, the Hughey *et al*. (2008) estimates are almost certainly too high. Compared with known big game hunting participation levels in specific locations, the latest SPARC estimates (SPARC, 2009) are almost certainly too low. Club membership data, firearms licence data, and hunting permit data are indicative of participation in excess of 40,000 big game hunters, about 1 percent of the total population.

Table 14 shows proportions of users at specific outdoor recreation sites who are engaged in hunting. In some locations, such as the Canterbury foothills, hunters represent a tiny proportion of total activity. However, at some locations hunting can be a sizeable proportion of total site use.

Table 14
Hunting use of outdoor recreation sites

Motu River	River users specifying hunting as their main activity while in the area	40%	Ritchie *et al*. (1983)
Central North Island	Visitors who specified hunting as their primary activity (Easter)	37.3%	Groome *et al*. (1983a)
Kaimanawa/ Kaweka	Visitors who specified hunting as their primary activity in the area	32.1%	Groome *et al*. (1983b)
Lake Sumner Forest Park	Hunting one of three most preferred activities at the Park	26.2%	Simmons & Devlin (1981)
Central North Island	Visitors who specified hunting as their primary activity (January)	25.6%	Groome *et al*. (1983a)
Lake Sumner Forest Park	Park users who had never hunted, but would like to	21.5%	Simmons & Devlin (1981)
Tararua Forest Park	Visitor to the Tararua Forest Park who had come to hunt	12%	Hull (1977) #
Coromandel Forest Park	Visitors to the Coromandel Forest Park who had come to hunt	3%	Kelly & Black (1972) #
Canterbury foothill forests	Visitors for whom hunting is the main activity in the area	1.2%	Groome (1984)

¶ cited in Groome *et al.* (1983a, p. 79) # cited in Simmons & Devlin (1981, p. 41)

5.5.7 Demographics

New Zealand hunters are at least 95 percent male, and more likely than expected to reside in a rural area. As with overseas, parents and family are the most important agents of introduction to hunting (Cessford, 1987; Groome *et al*., 1983a, 1983b; Simmons & Devlin, 1981; Gidlow *et al*., 2009). The most recent studies that have collected demographic information on hunters have found the largest groups of hunters to be aged between 35-54 (50%, Gidlow *et al*., 2009), 25-39 (54%, Fraser & Sweetapple, 1992), 30-39 (about 45%, Davys *et al*., 1999) and 25-44 (55%, Cessford, 1987) and 30-39 (34%, Nugent & Mawhiney, 1987)[27]. Fraser & Sweetapple (1992) examined the age profiles of hunters from a number of New Zealand studies and found that the percentage of hunters younger than 25 years declined during the 1980's, while the number of hunters older than 40 increased. A study by Gidlow *et al*. (2009) found that half of hunters surveyed were aged between 35 and 54 years. This decrease in recruitment of younger hunters and the subsequent aging population of hunters has been attributed to lower deer numbers, which has decreased the opportunities available to new hunters to practise hunting skills (Fraser & Sweetapple, 1992).

Compared with New Zealand society as a whole, hunters are more likely to be employed in the agricultural/forestry or skilled trade occupational categories, have higher levels of

27 Direct comparison of figures is difficult due to the different age group categories used in individual studies.

education, are more likely to live in rural areas, and are more likely to be single (Cessford, 1987; Simmons & Devlin, 1981; Groome *et al*., 1983a, 1983b)[28].

Simmons and Devlin (1981), Groome *et al*. (1983a, 1983b) and Cessford (1987) report on the origins of New Zealand hunters (Table 15). All three studies drew samples from public land hunters and found that small town dwellers were over-represented, and rural area residents were under-represented. For the North Island and Greenstone studies city dwellers were under-represented, but that was not the case at Lake Sumner.

Table 15
Origins of New Zealand Hunters

	City (>20,000)	Town (5,000–20,000)	Small town (<5,000)	Rural area
Lake Sumner[a]	65.9%	13.6%	17.7%	2.9%
Kaimanawa /Kaweka[b]	45.2%	20.3%	12.5%	20.2%
Kaimanawa /Kaweka[c]	53.5%	15.1%	6.5%	17.5%
Greenstone/Caples[d]	44%	18%	28%	11%
NZ population[a]	50.4%	18.9%	7.1%	17.0%
North Island population[c]	65.7%	7.9%	4.0%	22.3%

[a] Simmons & Devlin (1981) [b] Groome *et al*. (1983a)
[c] Groome *et al*. (1983b) [d]Cessford (1987)
Note: Both Kaimanawa/Kaweka reports used the same data – the authors do not explain the difference between the data in the two publications.

5.5.8 Success rates

Hunters' abilities to locate and kill deer have varied widely over time, with this variability possibly being dependent upon deer densities and behaviours. The annual deer harvest in the late 1980s (circa 80,000 animals) was about one third of the total breeding population, with recreational hunters responsible for about half the red deer harvest and nearly all harvests of other deer species, resulting in recreational hunters taking two thirds of all deer (Fraser, 2000). This harvest was substantially less than commercial deer harvests in the early 1970s, which were well over 100,000 animals per year (Caughley, 1983; Challies, 1985; Parkes *et al.*, 1996), but which fell substantially in the 1980s and 1990s (Nugent and Fraser, 2003; Nugent *et al*., 2001). Forsyth and Clarke (2001) estimated about 8 percent of the chamois population was harvested by 2,500 hunters in 1988, with an average success rate of 0.60 chamois per hunter for the year.

Yerex (2001, p.56) provides data on hunter success in the Atiamuri – Ohakune district based on Department of Conservation hunter returns in 1990 and 1992. Hunters were successful in bagging a deer, on average, in a little over four days of hunting. This figure also applied to fallow deer hunting in the most productive blocks in the Blue Mountains in 1985 (Nugent and Mawhinney, 1987), although Nugent (1988) estimated nine days of hunting per deer kill for the whole of the Blue Mountains. Fraser and Speedy (1997) report recreational kill rates in the Kaimanawa Recreational Hunting Area of 0.14 deer per day (7.1 days/deer) in the

28 A recent study by Gidlow *et al*. (2009) appears to contradict these results. However, Gidlow's sample was drawn from membership of the North Canterbury branch of the New Zealand Deerstalkers' Association, which is based in Christchurch City.

1983-1988 period and 0.18 deer per day (5.6 days per deer) in the 1989-1994 period. In the later period, 21 percent of deer seen were killed, with a mean of 0.85 deer seen per day hunted. Over the 1989-1993 period, the mean deer sighting rate was 0.46 to 0.63 deer per recreational hunter day in the Pureora Conservation Park, resulting in a mean kill rate of 0.13–0.21 deer per day, which is 4.8-7.7 days hunted per kill (Fraser, 1996). Few Blue Mountains hunters were successful in 1984/5, with 3.5 percent of the hunters taking 51 percent of the deer and only 15 percent of hunters harvesting any deer at all (Nugent, 1988). Yerex notes that only 38 percent of hunters in the Atiamuri – Ohakune District killed a deer there in 1991, and only 33.9 percent were successful in 1992.

Nugent (1992) estimated the median recreational and commercial harvest of red deer was one deer per hunter in 1988, and 3 big-game animals of any species. The skewed distribution of harvests is indicated by much higher mean harvests than medians. Mean annual harvests were 3.14 red deer and 11.49 big game per hunter, the latter figure being largely comprised of an average of over 10 pigs per hunter. Nugent's estimates of kill rates for ground hunters were 0.24 red deer, 0.23 deer of any species, and 0.44 big-game of any species per day hunted, again largely influenced by high success rates and participation levels for pig hunting (0.61 pigs per day). Government hunters in the Kaweka Ranges during the 1980s had better success, at a rate of 0.74 deer per day hunted, down from 1.14 deer per day in the 1970s (Davidson and Fraser, 1991).

A 1995 survey of recreational tahr hunters (Davys *et al*., 1999) found the mean tahr harvest rate was 0.24 tahr per day hunted. The total rate for these hunters climbs to 0.28 animals per day when small harvests of chamois and deer are included.

Success data reported here are at least 15 years old and relate to periods of low animal numbers. To our knowledge, contemporary figures are unavailable. However, anecdotal evidence suggests higher success rates in recent years.

5.5.9 Reasons for cessation of hunting

Studies of New Zealand hunters have ranked a lack of time as the number one reason for withdrawing from hunting (Table 16). Other often cited reasons for stopping hunting were a decline in animal numbers, a lack of access to hunting areas, lifestyle changes and changes in family circumstances (Simmons & Devlin, 1981; Groome *et al*., 1983b, Thorp, 1997).

While harvest success is not essential for the satisfaction of all hunters, there is a group of hunters for whom it is, and repeated unsuccessful hunting trips for these hunters may cause levels of satisfaction to decline to the point where they cease to participate (Groome *et al*., 1983b). Nugent *et al*. (2001: p.270) claim "Most hunters either cease hunting or move to other areas when success rates are low" and note (p.277) that "An increase in the average age of hunters over the past 20 years suggests that recruitment of hunters into the sport may be declining (Fraser 2000)". Approximately 80 percent of former hunters surveyed reported that they ceased to participate within one or two years of their last successful hunt (Simmons & Devlin, 1981; Groome *et al*. 1983b).

Table 16
New Zealand hunters' reasons for not hunting

	Lake Sumner[a]		Central North Island[b]	
	Interruption or ceased hunting	Retirement (primary reason)	Interruption	Retirement (primary reason)
Family commitments	14	21.4	25.7	18.7
Work/overseas trip	34		25.3	
Other interests	14		24.5	
Access	8	10.7	8.2	6.6
Decline in animal numbers	18	21.4	6.7	10.4
Health			5.2	
Age			0.7	5.5
Health or Age	10			
No-one to hunt with			2.2	
Cost	4	1.5	1.5	2.7
Lack of time		28.1		28.0
Physical fitness		10.4		6.6

[a] Simmons & Devlin (1981) [b] Groome *et al*. (1983a)

Nugent and Mawhinney (1987) found that the most common reasons for ceasing hunting fallow deer in the Blue Mountains were change in residential location (2.7% of hunters in the last year) and too few deer (2.5%).

The single most important reason why hunters would not return to the Greenstone/Caples was insufficient game numbers (39%), followed by high use levels (28%), poor hunting (11%) and lack of trophy potential (5%) (Cessford, 1987). Game-related matters were responsible for over half of use discontinuation.

Chapter 6
Conclusions

The objectives of this research were to identify the main motivations for participating in big game hunting, identify the factors that influence hunter satisfaction and assess hunting participation levels. Overall, New Zealand evidence, albeit sparse, is consistent with findings from elsewhere.

Hunters are motivated in order to fulfil a number of desired outcomes, including being outdoors, experiencing nature, harvesting animals for meat or trophies, and spending time with family and/or hunting companions. Hunters may be motivated by more than one of these outcomes, and the relative importance of any one outcome varies between individuals. Overall, experiencing nature and the social aspects of hunting are the top two hunter-based motivations, while the excitement of seeing deer and obtaining meat are the top two motivations relating to animal interactions. Whilst much of the popular hunting literature places much emphasis on trophies, collecting a trophy is not a primary motivation for most hunters.

Satisfaction is closely related to motivations because the extent to which the desired outcomes are achieved influences satisfaction levels. Factors which have an effect on satisfaction include harvest success and related variables (deer density, deer seen, deer sign seen, herd quality), hunter density, perceived crowding, regulation, enjoying the outdoors, seeing other wildlife and time spent with family and hunting companions. There are many interrelationships between these factors, and depending on the context and the motivations of the individual hunter, these factors may have either a negative or positive effect on satisfaction. The hunting experience is multi-dimensional and individual-specific with significant variance amongst hunters. The range of salient attributes poses significant challenges for game and hunter managers, suggesting the need for greater understanding of the diversity of preferences amongst the New Zealand hunting community and the nature of the experiences required to satisfy such diversity while avoiding conflict between different types of hunters, as well as between hunters and other backcountry users.

Whilst hunting success is not the primary motivating factor for participation, continued lack of success reduces participation. Low game abundance leading to lack of hunting success appears to have been responsible for a decline in New Zealand big game hunting participation in the 1980s and 1990s, and resurgence in animal numbers in the last decade appears to have stimulated participation.

Participation rates were found to be broadly similar throughout the countries reviewed. Nationwide studies undertaken in New Zealand, the United States and Canada have estimated hunting participation rates to be in the order of 5 percent. While this may appear to be a small proportion of the population, studies of backcountry recreation area users have underlined the significance of hunting in the total amount of backcountry activity, with hunters contributing up to 40 percent of visitors to some sites.

Some of the factors with the strongest negative effects on hunter participation numbers are urbanisation, and changes in demographics such as an aging population and an increase in the proportion of ethnic minorities who are traditionally less likely to participate in hunting. Other factors linked to decreases in hunter numbers include reduced recruitment of young hunters and changing cultural norms. New Zealand demographic and cultural changes appear to be following these trends observed abroad, which can be expected to reduce big game hunting participation unless offset by changes in the quality of hunting experiences. Current New Zealand hunting success rates are not known but, based on historic data, are likely to be low – resulting in relatively low satisfaction and hunter retention, particularly for participants with predominantly "animal-related" motivations. Managing either or both hunters and game species has the potential to provide greater success, whether that is judged by seeing animals, harvesting meat or taking a trophy, and consequently to boost both participation and the value of the hunting experience.

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